SITE SELECTION 8.2

The study sites selected for sampling bottom material will affect the quality of the data collected. Guidelines are provided in this section for selecting the location and number of subareas or sampling points at a site. Apply these guidelines as appropriate for meeting study objectives.

LOCATION OF SAMPLING SITES 8.2.1

For most studies, in most bodies of water, a single site or sampling point is not adequate to represent the physical properties, distribution, and abundance of chemical constituents and biologic communities in a water body. Each body of water, whether flowing or still, has a unique set of conditions to be identified for the site-selection process. These conditions must then be evaluated with respect to study objectives for sampling bottom material. Mudroch and MacKnight (1994) state, “There is no formula for design of a sediment sampling pattern which would be applicable to all sediment sampling programs.”

Before selecting a site location, review the historical information available about the site, such as flood history, land use, and type and source of any previous contamination. Delineate in three dimensions the environmental system or portion of that system to be studied. When selecting a sampling site, consider the safety of field personnel and the type of equipment and sampling methodology that will be needed. After the site has been selected, map the area from which samples will be collected. Consider using global-positioning equipment (for site positioning), a side-scan sonar sub-bottom profiler, and (or) acoustic survey (such as echo, seismic reflections, and refraction) to characterize the configuration of the stream bottom, and photography to help identify sampling location(s).

As part of the process for selecting site locations, consider study objectives with respect to:

- ▶ The proximity to the sampling site of manmade structures such as bridges, roads, and piers—selecting sites near such structures can interfere with data-collection objectives and therefore such sites normally are avoided.
- ▶ Locating sites near a water discharge-stage gaging station—such site locations are advantageous for data interpretation.

- Perennial flowing streams—Sample during low-flow periods. Ephemeral and intermittent streams—Sample immediately after water recedes, while bottom material is still wet.

- The geomorphology, geology, and geography of the area, such as its size and shape, tributary and runoff patterns, streambank structure and lithology, land use, and climate.

- The chemical, physical, and biological character of the water column above the sample-collection site (for example, water depth and hydraulics, fluvial-sediment transport characteristics, and especially the presence or absence of oxygen).

- The chemical, physical, and biological character of the bottom material to be sampled.

  – Chemical characteristics include geochemistry/mineralogy, oxidation state, colloidal/noncolloidal fractions, inorganic/organic composition, spatial and temporal heterogeneity, bioassay data, and data from reconnaissance sampling.

  – Physical characteristics include size fraction, texture, structure, thickness, pore-water content, horizontal and vertical spatial heterogeneity, and temporal heterogeneity.

  – Biological characteristics include population densities, and community structure and diversity of aquatic organisms.

- The use of either statistical or deterministic methods to select the location and number of sampling sites.

8.2.2 NUMBER OF SAMPLING SITES

The number of sampling sites or subareas at a site is determined when the scientific approach to the study is designed.

Statistical or deterministic methods can be used to select the distribution and number of sampling sites. Deterministic methods for selecting sampling sites for bottom material are based on professional judgment alone. Shelton and Capel (1994) discuss use of deterministic models to determine the presence or absence of chemical constituents, carry out surveillance monitoring, identify the occurrence and extent of target constituents, and for environmental reconnaissance. Statistical approaches are used for the more rigorous analyses frequently required for study objectives that address environmental assessments of chemical mass-transport loading and remediation, and temporal and spatial change and magnitude of chemical constituents.